



# Master Environmental Library

<http://mel.dmsso.mil>

# MEL

**An Environmental Data Source  
for DOD Applications**

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Naval Research Laboratory**

*ITEC98 LAUSANNE, SWITZERLAND APRIL 29, 1998*

# Outline

- **M&S background: need for environ. data**
- **Problem: access to distributed data sources**
- **MEL approach: single common interface**
- **Current status: capabilities and data**
- **Example: network computing**
- **Plans: initial operational capability 1 Oct 98**
  - **services layer**
  - **extended capabilities**

***WILL DESCRIBE A WORKING SYSTEM AND PLANS TO EXTEND IT.***

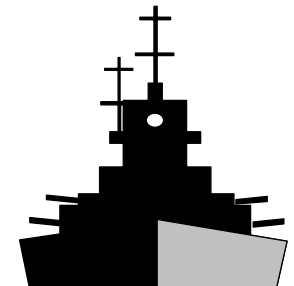
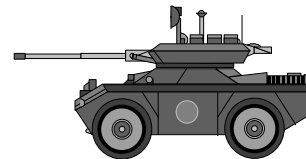
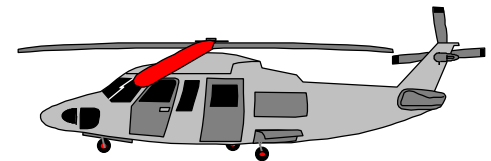
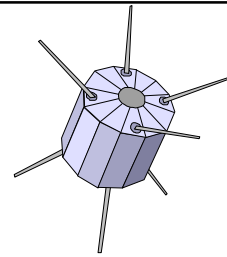
# Modeling and Simulation (M&S) Requirement

- ❑ Environmental effects need to be included in M&S

- ✱ Major objective in the DOD M&S Master Plan (DOD MSMP)

- ❑ Requirement - provide access to authoritative data and related tools

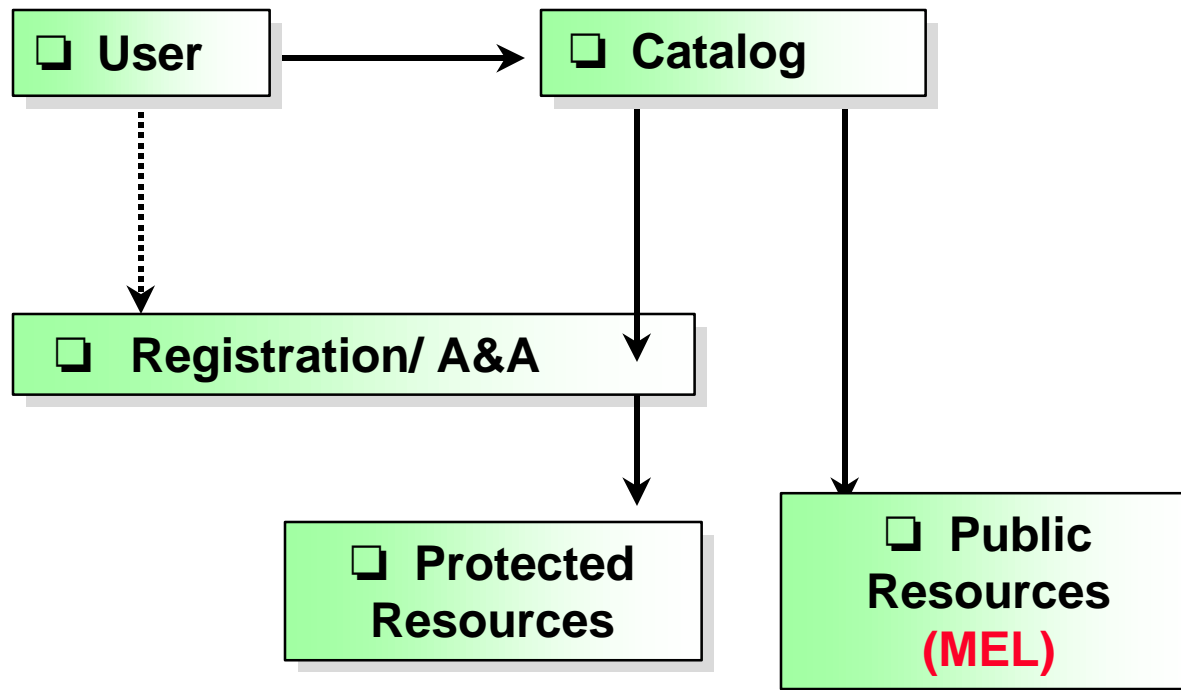
- ✱ Motivation for MEL



**THE SIMULATION WORLD MUST INCLUDE THE EFFECTS OF THE ENVIRONMENT.**

# MEL: MSRR Environmental Node

*The MSRR Is Organized to Facilitate Access to M&S Resources and Safeguard Them As Appropriate*



**MEL ACCESS THROUGH THE MSRR IS SIMPLE AND DIRECT.**

<http://www.msrr.dmsso.mil>

# Master Environmental Library *Vision*

*To support the warfighter and national decision makers ... through direct and timely access to natural environmental information, products and data ...*

## M&S Users

- ✧ Training
- ✧ Analysis
- ✧ Acquisition
- ✧ Logistics
- ✧ Test & Evaluation
- ✧ Doctrine
- ✧ Support to Operations



**Data: on shelves, subscription  
Fusion/Visualization/Products :  
scheduled, demand, interactive**

**“Reuse and interoperability”**

## Data Types

- ✧ Grids
- ✧ Observations
- ✧ Raster
- ✧ Vector

## Env. Regime

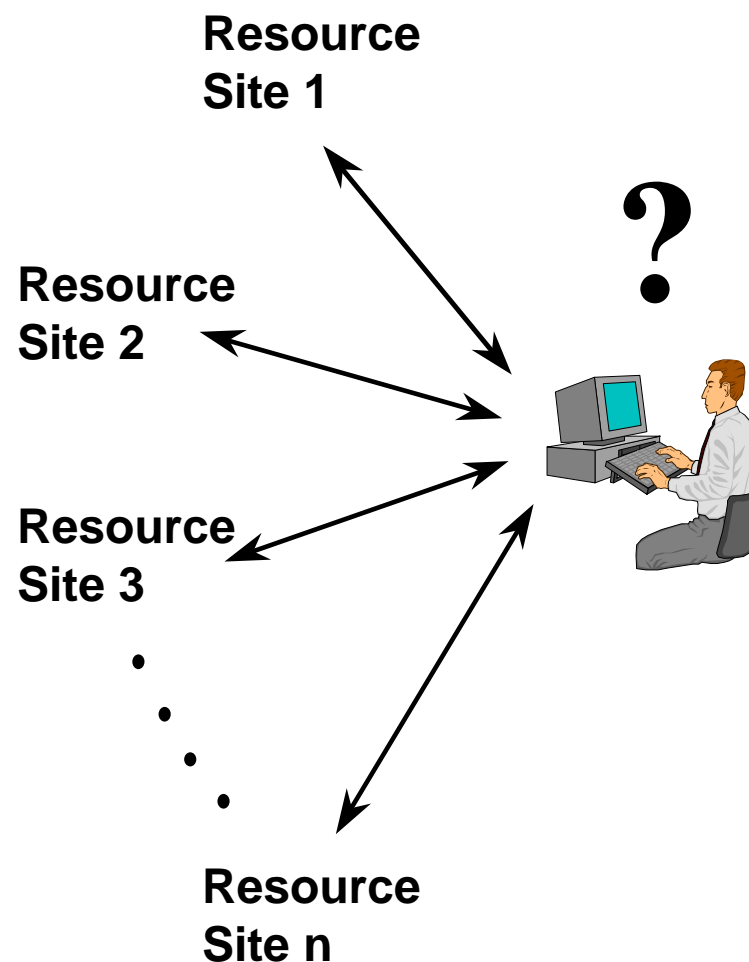
- ✧ Air/Space
- ✧ Ocean
- ✧ Terrain

## DOD, Other

**MEL IS A ONE STOP ENVIRONMENTAL INFORMATION SHOP.**

# The Problem

- Existing environmental resources are typically hard to find, duplicative, and hard to access.
- There is a lack of effective tools to create internally consistent data sets across all environmental domains (terrain, ocean, atmosphere, and space).
- There is a lack of comprehensive descriptions.

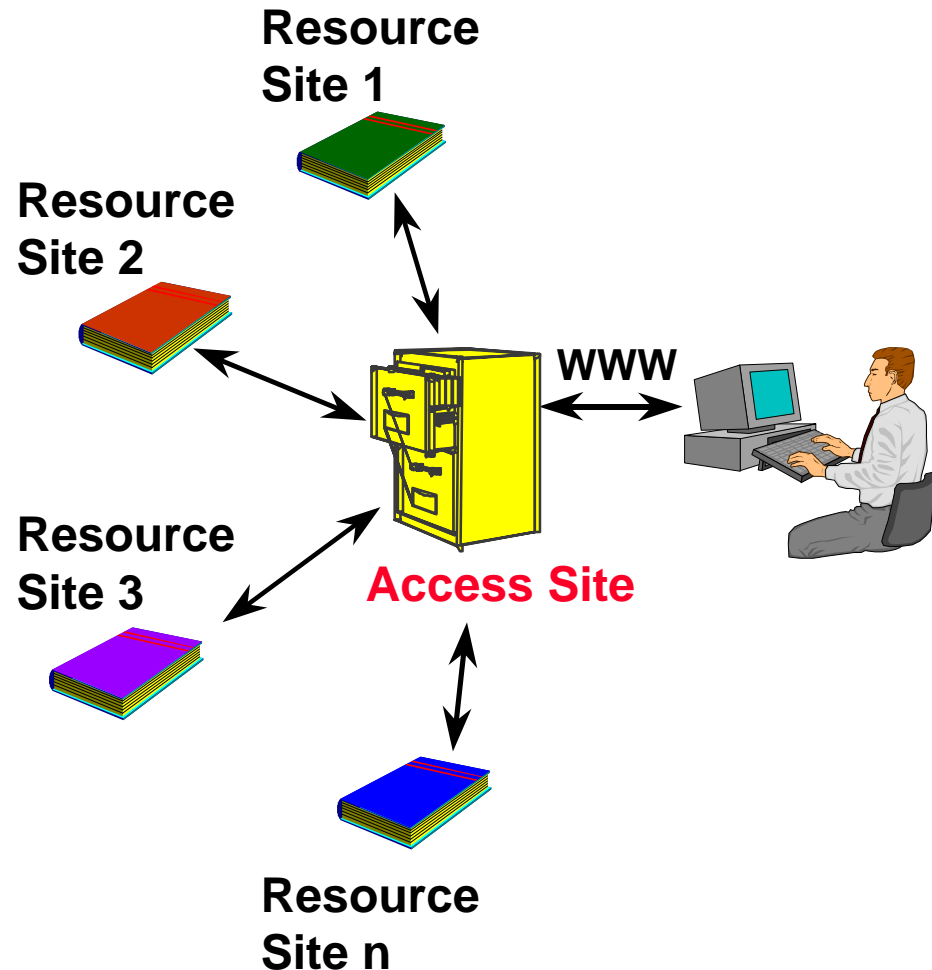


*THE PROBLEM IS NOT A LACK OF DATA BUT DISCOVERING AND RETRIEVING IT.*

# MEL Data Discovery

## 3 - tier geospatial data warehouse using:

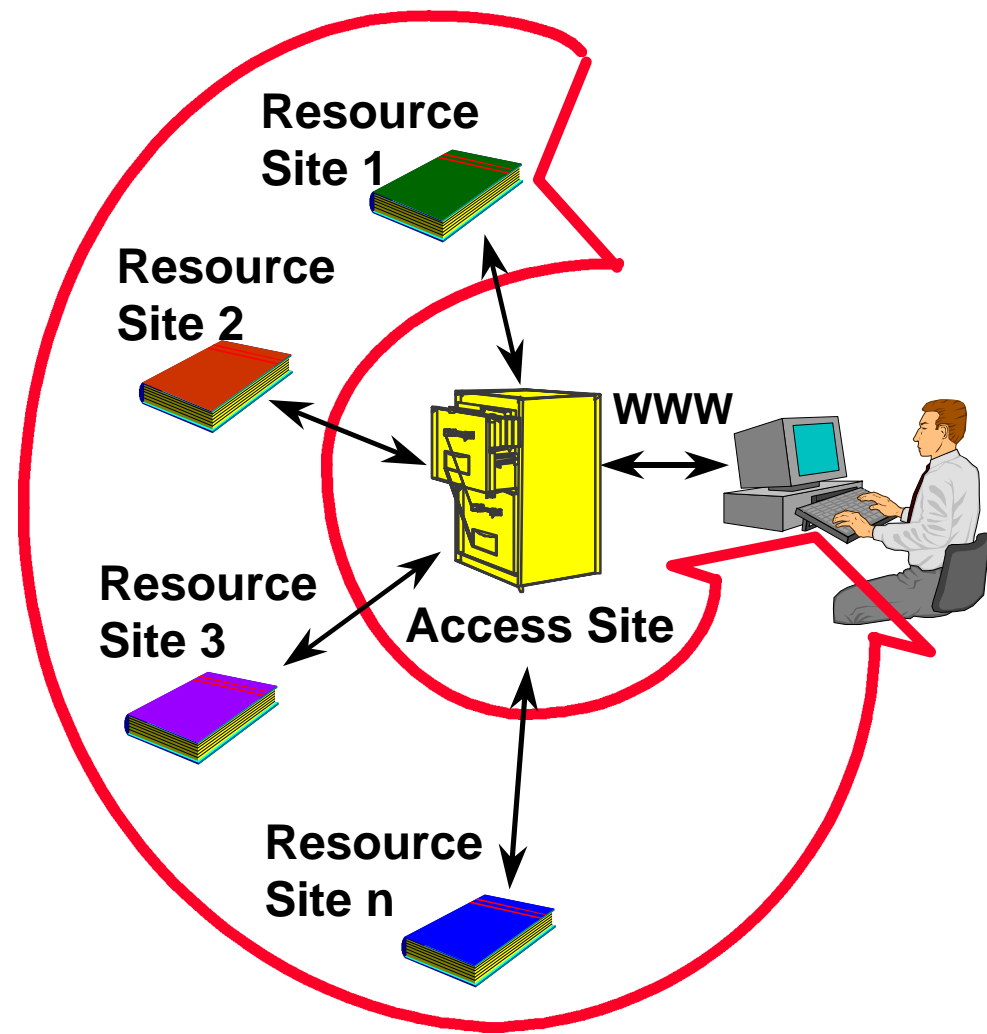
- ❑ A single access point to search metadata at distributed resource sites and to request and deliver data
- ❑ Standard metadata to describe data in different formats at distributed sites



*A KEY TO DATA DISCOVERY IS A CONSISTENT METADATA CONTENTS FORMAT.*

# MEL Data Delivery

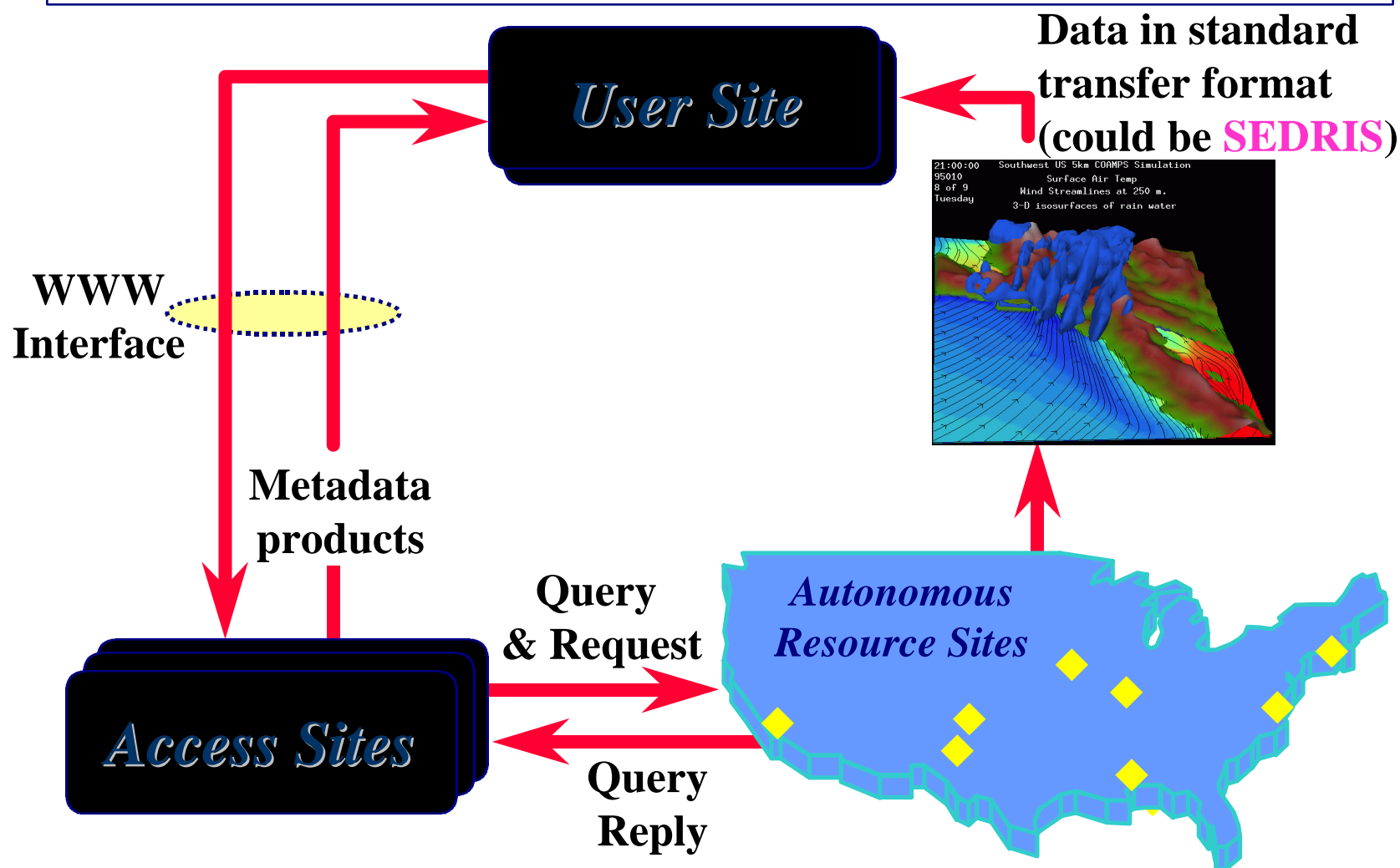
- ❑ Use a single point of access to request data from distributed resource sites.
- ❑ Deliver data in standard transfer formats by a variety of means, such as ftp.



**FOR AN APPROVED REQUEST, THE DATA IS SENT IN A STANDARD TRANSFER FORMAT.**



# System Architecture



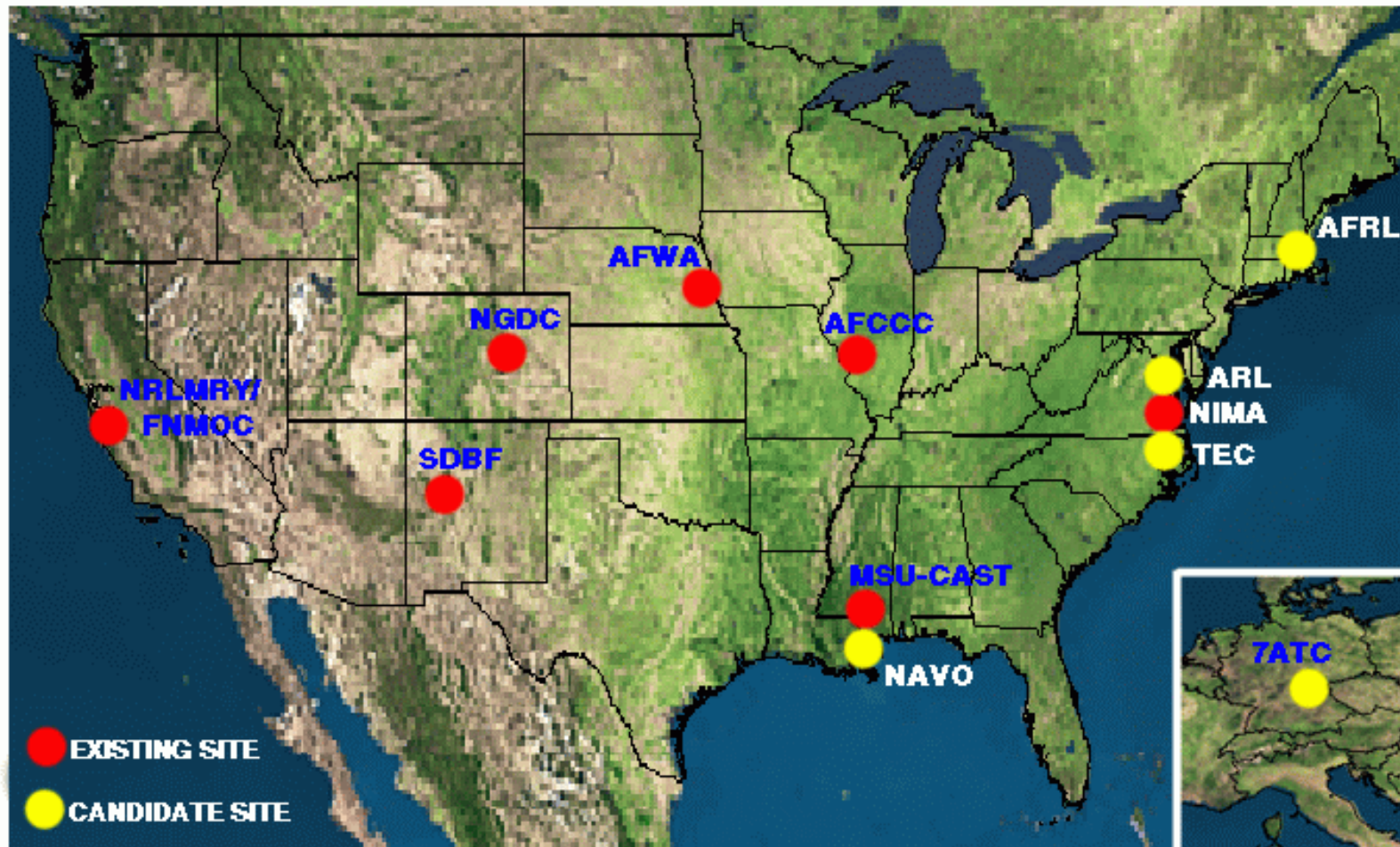
**MEL APPROACH: 3 TIER ARCHITECTURE SIMPLIFIES USER ACCESS**

# Key Features

- ❑ Data stays at resource sites under local control. Resource site maintains standard metadata.
- ❑ MEL provides single point of access to distributed geospatial data.
- ❑ Interface based on Web tools.
  - ✱ HTML / Java interface ➡ query/request
  - ✱ Z39.50 servers ➡ search metadata (Federal Geographic Data Committee Metadata Content Standard)
- ❑ Data transfer through standard formats.
  - ✱ Vector Product Format, National Imagery Transmission Format Standard, Gridded Binary format, Binary Universal Format for the Representation of meteorological data, etc. **SEDRIS**
- ❑ A classified system is also being developed.

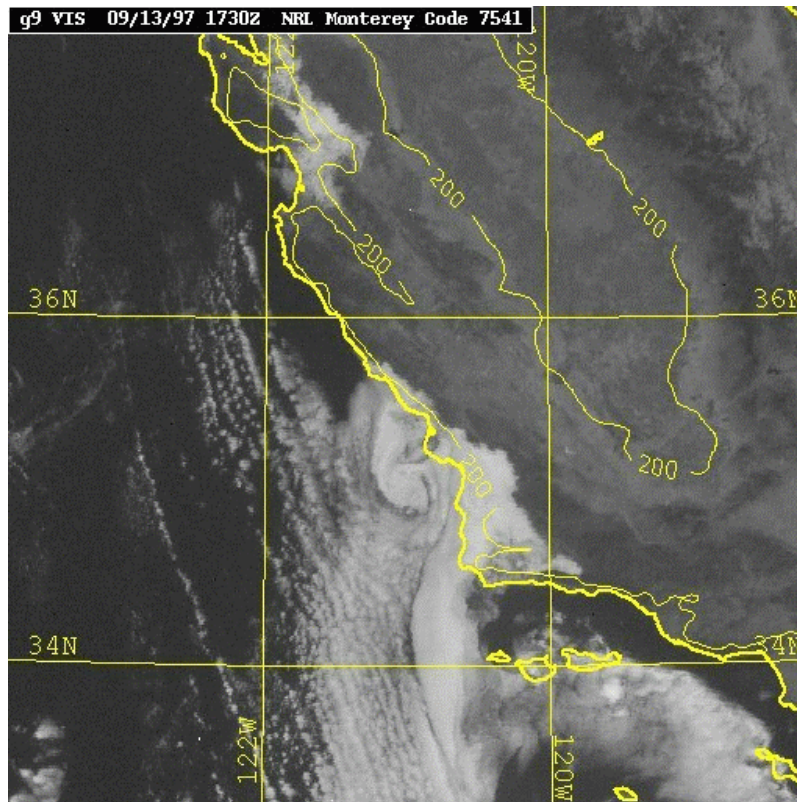
**MEL PROVIDES UNIFORM ACCESS TO THE METADATA. RESOURCE SITES CONTROL THE DATA.**

# MEL Resource Sites



*MEL RESOURCE SITES ARE DISTRIBUTED, AUTONOMOUS, MULTI-SERVICE AND NON DOD.*

# Satellite Imagery



**GOES-9 visible 13 Sep 97**

## **NRL-MRY:**

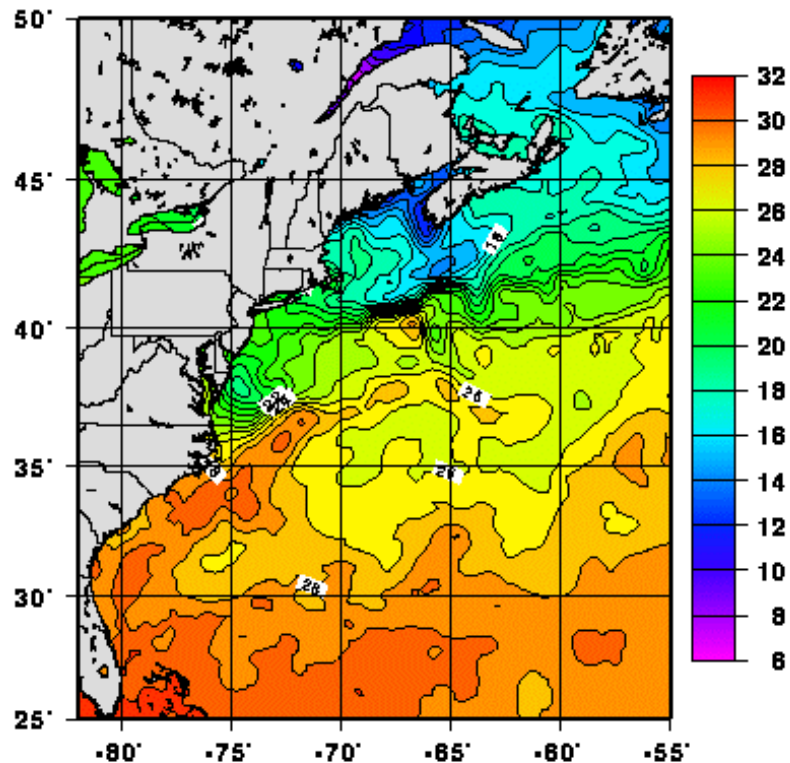
- ☐ GOES-8 (Tropical Atl)
- ☐ GOES-9 (10 areas)
- ☐ GM5-Winds (4 areas)

## **AFWA:**

- ☐ DMSP:
  - ✱ N. Hemisphere
  - ✱ S. Hemisphere



# MEL FNMOC OCEANOGRAPHIC PRODUCTS



**OTIS W. ATLANTIC**  
**26 Aug 1997**

- ☐ Global WAM (1°)
- ☐ Regional WAM
  - ✖ Mediterranean (0.25°)
  - ✖ Korea (0.2°)
- ☐ Global OTIS (1°)
  - ✖ OTIS W. Atl. (0.2)
  - ✖ OTIS Greenland (0.2°)
- ☐ Global TOPS (1°)

# DBDB-V BATHMETRY

**SOURCE: Naval Oceanographic Office**

❑ DBDB5 1/12° Global Coverage

❑ DBDB2 - 1/30°:

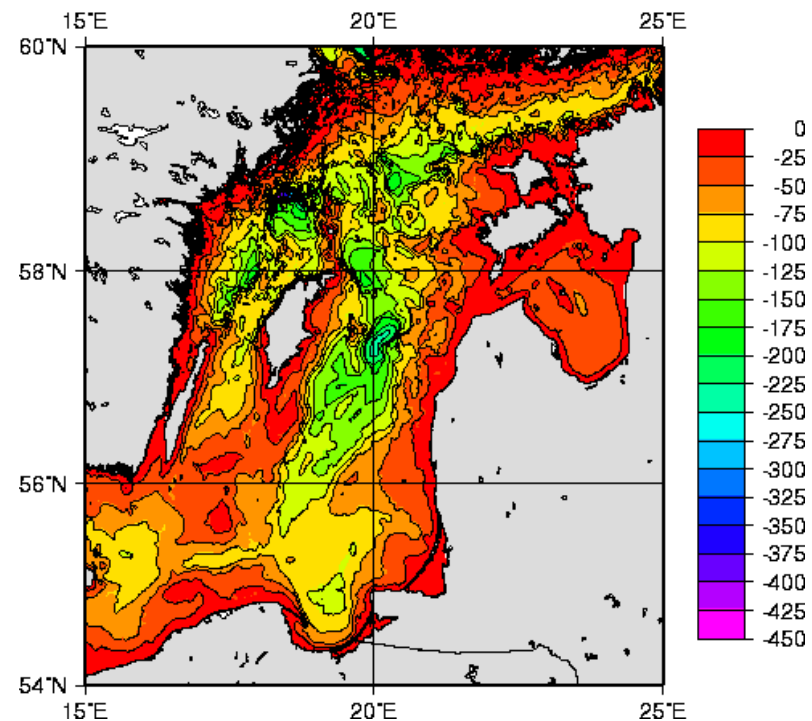
- ✖ Persian Gulf
- ✖ Mediterranean Sea

❑ DBDB1 - 1/60°:

- ✖ South China Sea
- ✖ Baltic Sea
- ✖ US West Coast

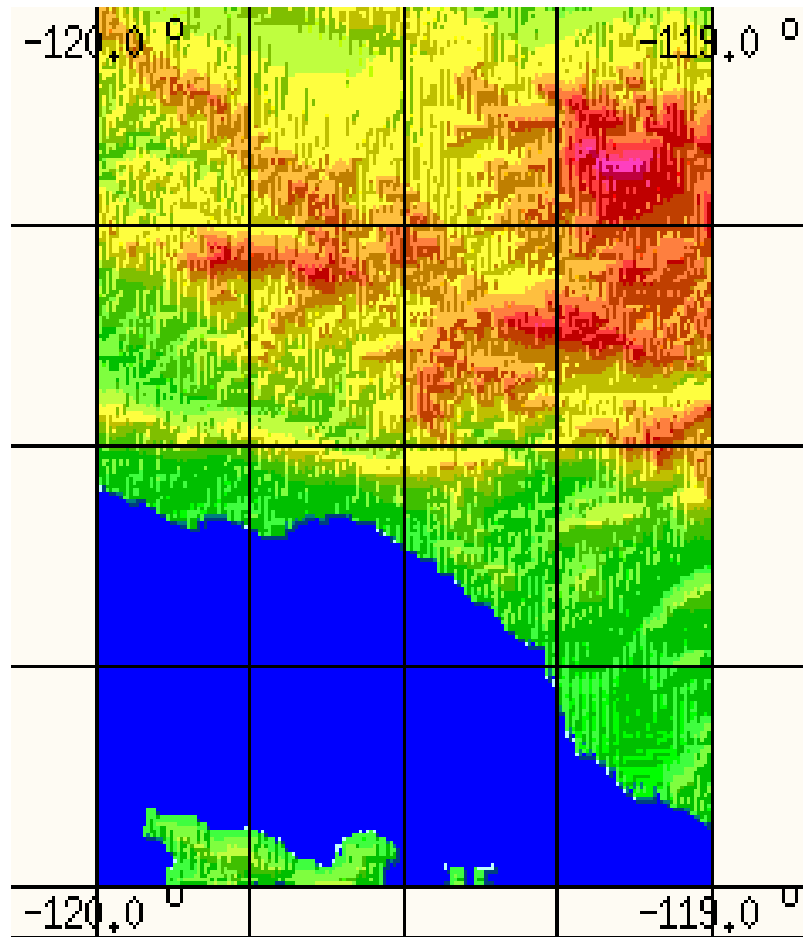
❑ DBDB0.5 - 1/120°:

- ✖ Selected US, other



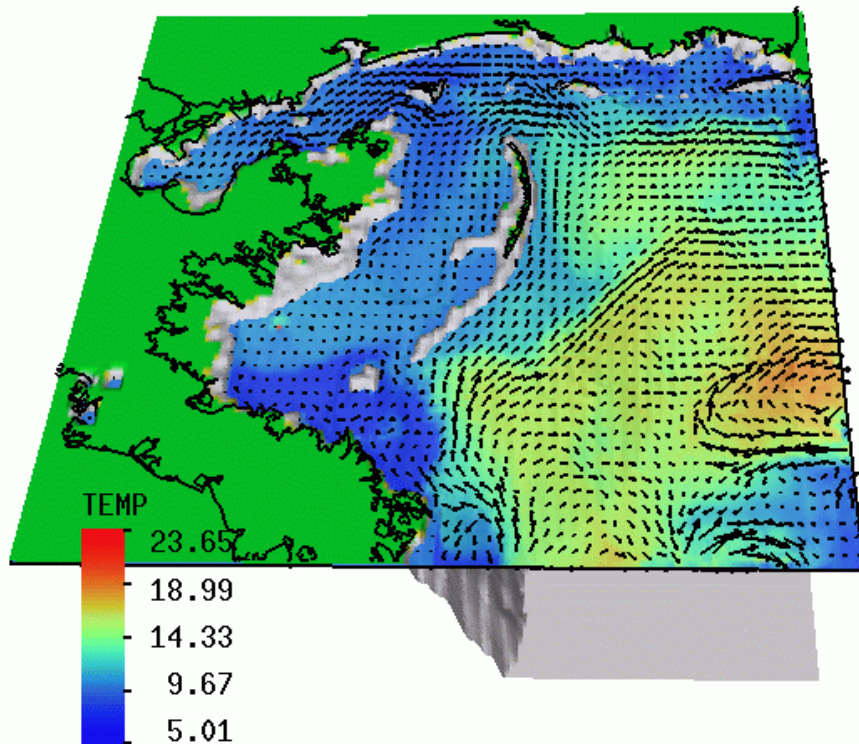
**DBDB1 - BALTICS**

# Terrain Databases



- ❑ **Digital Terrain Elevation Data Level 0 (DTED0)**
  - ✖ available for most portions of the world, in 30 x 30° sections.
  - ✖ Data can be subset
  - ✖ 1 km resolution
- ❑ **DTED1, DTED2 and additional terrain products available for some areas**

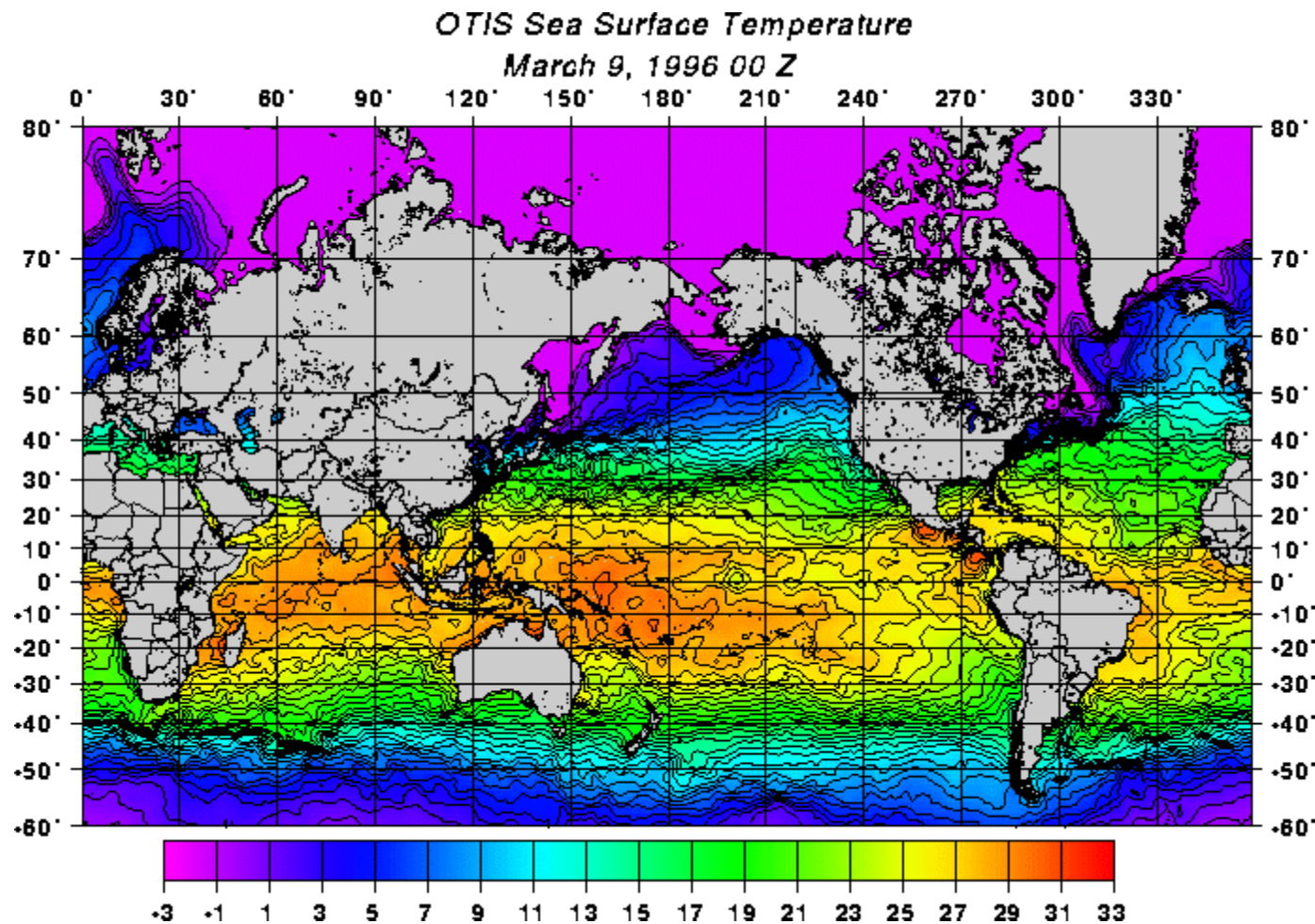
# Very High Resolution Coastal Currents



- ❑ Princeton Ocean Model, initialized with AVHRR SST and forced with “real-time” CONUS NORAPS winds from MEL.
- ❑ Demonstrated during JTFX-2.

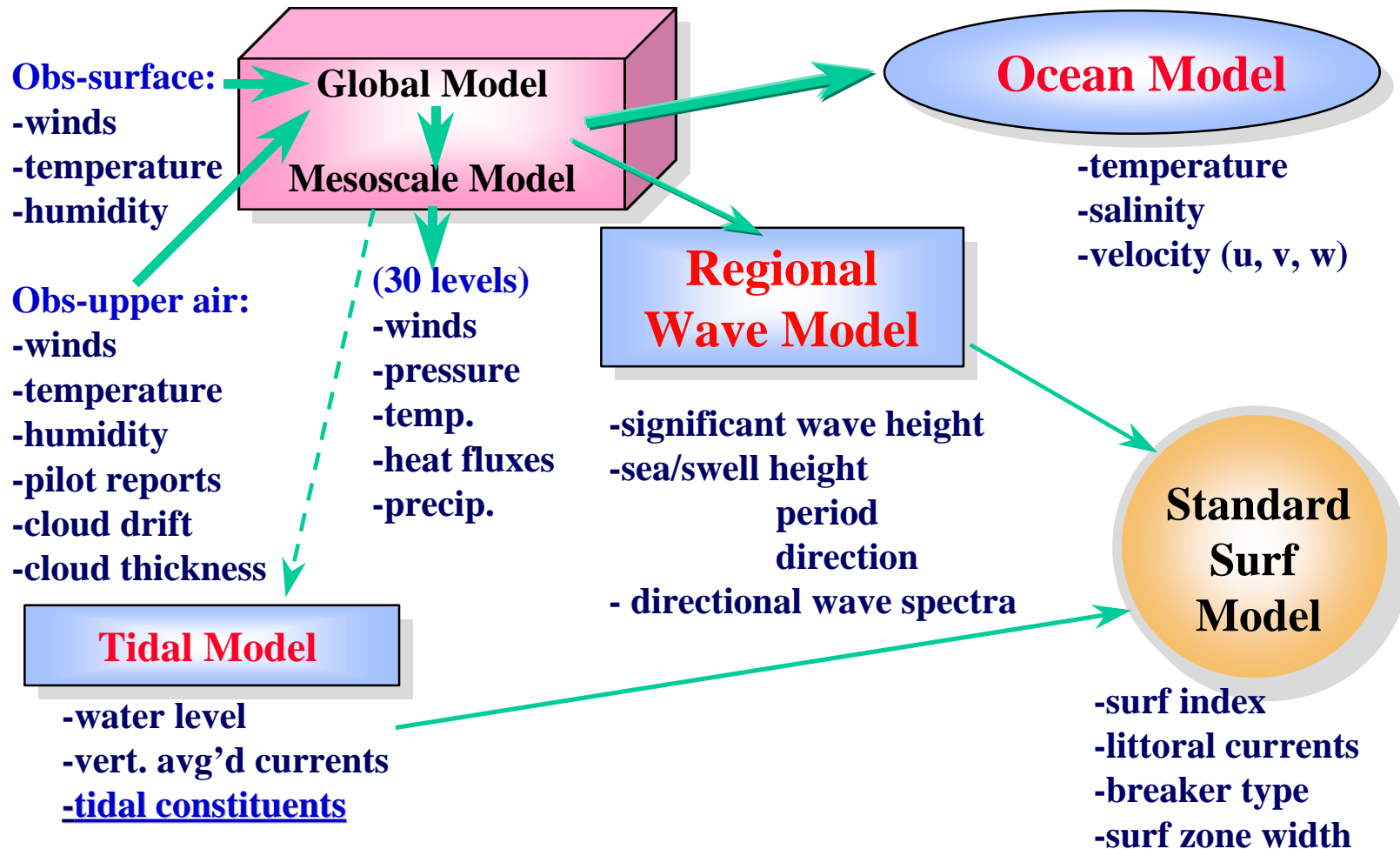


# Sample Data Set



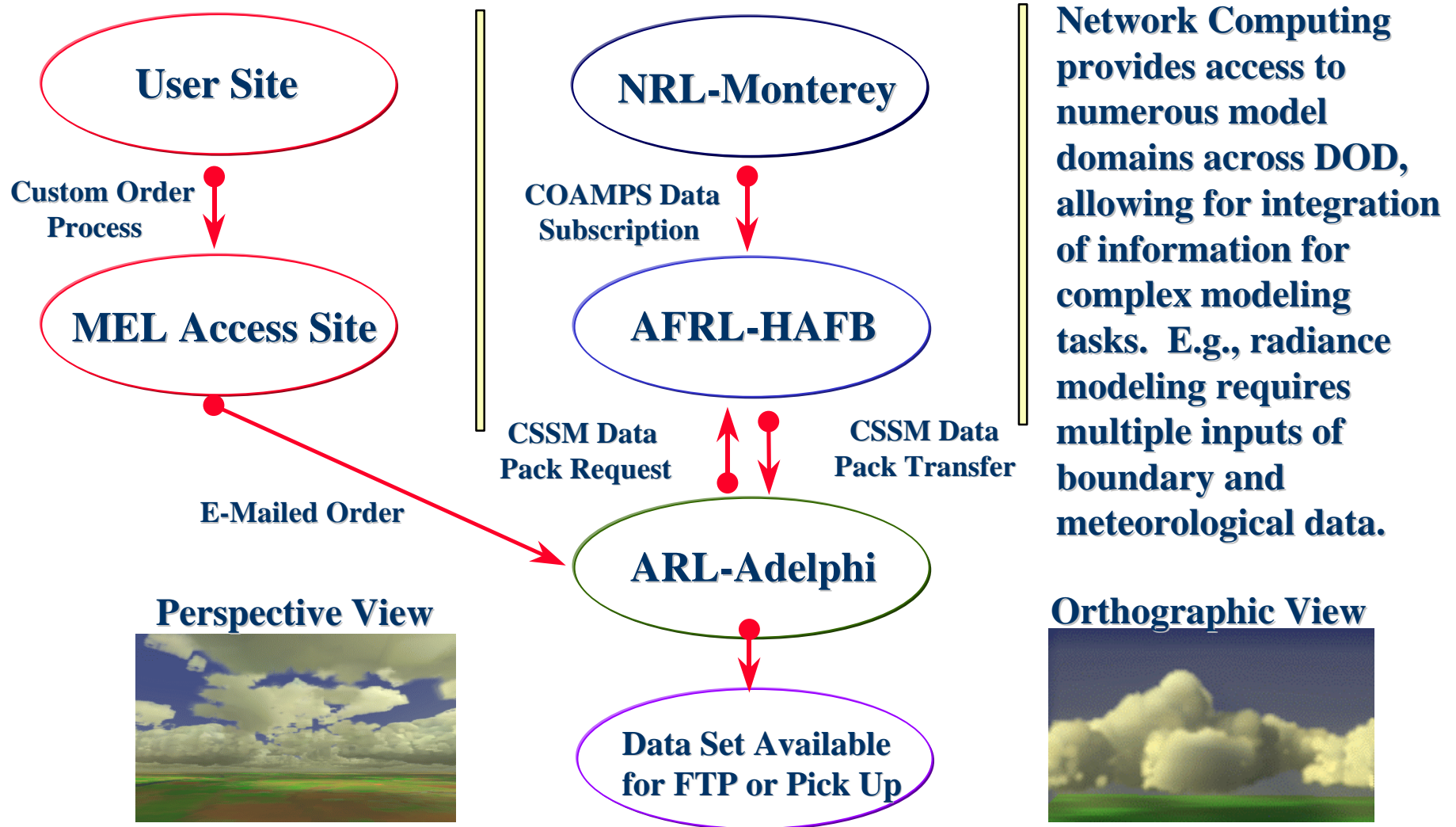
**MEL PROVIDES REAL DATA, NOT JUST PICTURES.**

# Integrated Synthetic Scenarios



**INTEGRATED DATA SETS MUST BE PHYSICALLY CONSISTENT.**

# MEL Network Computing



**THE MEL ARCHITECTURE SUPPORTS MUCH MORE THAN SIMPLE DATA ACCESS AND DELIVERY.**

# **MEL Planned Capabilities**

- ☐ **User profile (API defaults, preferences)**
- ☐ **Customizable query interfaces**
- ☐ **Services via CORBA & Internet API**
- ☐ **DOD approved keywords**
- ☐ **Z39.50 implementation**
- ☐ **User history**
- ☐ **Subscription or pull services manager**
- ☐ **Improved administration tools**
- ☐ **Improved access control**

*MEL IOC (FY98) WILL IMPROVE THE ARCHITECTURE AND USER FUNCTIONS.*

# MEL 2.0

- ❑ Internet & Classified hosting at DMSO 10/1/98
- ❑ New MEL Services Architecture
- ❑ Improved user interfaces
- ❑ Metadata management system
- ❑ MEL application packages:
  - ✖ MEL Access Site Software (MASS)
  - ✖ MEL Resource Site Software (MRSS)
  - ✖ Testing/Monitoring suite

*MEL 2.0 WILL BE READY AT END OF FY98.*

# MEL Services Architecture (MSA)

- ❑ Keystone that provides **any application** access to MEL functionality.
- ❑ Direct user application access to data rather than pictures of data.
- ❑ MSA API described by industry standard Interface Definition Language (IDL).
  - ✱ data query, data order & subscription, metadata access, ...

*MSA WILL PROVIDE BASIS FOR SEPARATE APPLICATIONS OF MEL.*

## **MEL Services Architecture (cont.)**

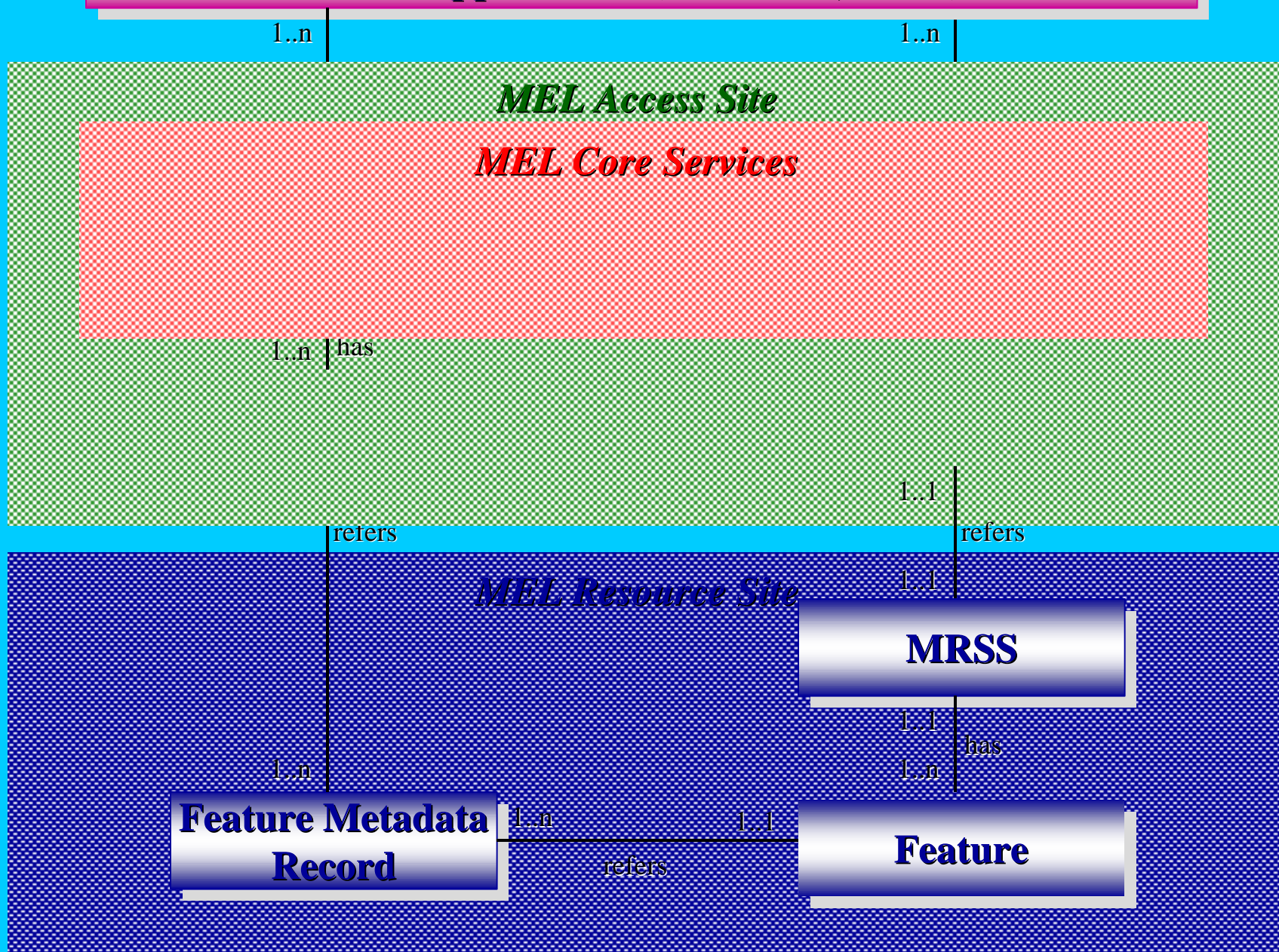
- ❑ Configurable Metadata management system allows for domain/site specific metadata creation policies.**
- ❑ Easy implementation upgrades as new technologies emerge without affecting API.**
- ❑ Supports OpenGIS concept of catalogue, warehouse, & feature collection services.**
- ❑ API available in C, C++, Java.**

***MSA IS DESIGNED TO BE INTEROPERABLE WITH EMERGING STANDARDS.***



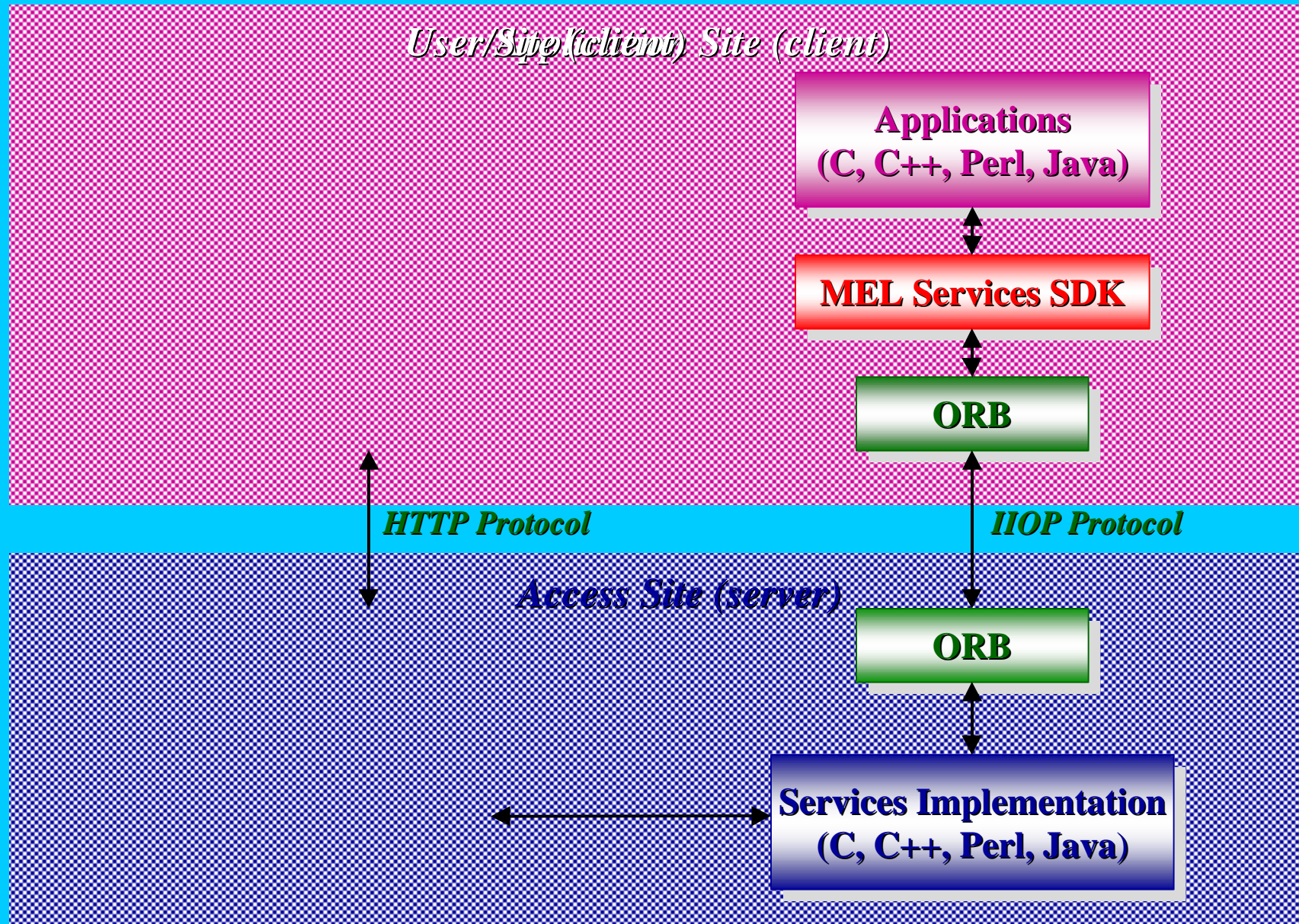
# MEL Services Architecture

## MEL Applications (ex: MASS, WSG)





# MEL Services Deployment Diagram



# MEL 2.0 Direction

- ☐ The new Services Architecture provides a long term growth path for MEL by defining an API to DoD environmental search and discovery services.
- ☐ With version 2 of MEL, any application can have access to MEL Services.
- ☐ We look forward to the official hosting of the MSRR's MEL node at DMSO at the end of FY '98.

***MEL 2.0 PROVIDES MUCH GREATER REUSABILITY OF THE MEL SERVICES.***

## MEL Operational Support Characteristics

- \* **Adaptable:** MEL designed to integrate legacy resource sites.
- \* **Practical:** OCD being developed for using MEL to support op forces.
- \* **Efficient:** MEL subscription and metadata features consistent with current Smart Push and Warrior Pull initiatives.
- \* **Survivable:** Mirrored access sites and automated searches of multiple resource sites provide MEL with better contingency support capabilities than single source systems.
- \* **Easy-to-use:** MEL has single common user interface and is consistent with JMCIS and DII COE interface guidance.
- \* **Supportable:** MEL V2.0 being documented IAW current DOD standards and is consistent with JMCIS/GCCS documentation initiatives.
- \* **Secure:** System high architecture of SIPRNET MEL provides op users with improved security for classified or sensitive support information.
- \* **Affordable:** MEL based on evolving WWW technology.

*MEL CAN SUPPORT OPERATIONAL SYSTEMS.*

# Summary

- ❑ MEL provides *uniform consistent interface* for geospatial data discovery, access, subscription, manipulation, network computing, and delivery.
- ❑ MEL *exploits enabling technology* which is open, available, and evolving.
- ❑ MEL can support *both M&S and operational customers*.
- ❑ A *classified system* is also being developed.

**MEL IS THE FIRST DOD GEOSPATIAL DATA DISCOVERY AND ACCESS SYSTEM .**

# MEL Booth

- ☐ Visit the MEL booth at the DMSO exhibit
- ☐ Joint with Modeling and Simulation Resource Repository (MSRR)
- ☐ Visit our web site

<http://mel.dmsomil>

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